ORDER

6820.13A

PROJECT IMPLEMENTATION PLAN
FOR LOW POWER TACAN ANTENNA

MAY 19, 1993

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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Initiated By: ANN-130

*U.S. GPO: 1988-562-162

FOREWORD

This order, the Project Implementation Plan (PIP), provides technical guidance and management direction for the orderly implementation and acceptance of the Low Power Tactical Air Navigation (TACAN) Antenna (replacement antenna for the TACAN facility) into the National Airspace System (NAS). This is a Capital Investment Plan (CIP), an infrastructure replenishment project, which provides for the replacement of selected RTA-2 TACAN antennas. This order identifies and describes specific requirements, events, tasks and activities to be accomplished, as well as project implementation procedures, organizational and program management. Management responsibility for this program is assigned to the Program Manager for Navigation, ANN-300, with acquisition directed by the Associate Program Manager for Engineering, Navigation Program, ANN-130.

The original order has been revised to include data changes incorporated by contract modifications, and organizational restructuring. System delivery schedules have been updated and additional data has been provided on system description, operating parameters, and installation requirements and procedures.

The goal of this order is to provide a uniform approach for all organizations that have a role in conducting activities necessary to implement any portion of this project. The procedures and responsibilities in this order were developed using current agency directives. The format and content is organized and presented per FAA-STD-036, Preparation of Project Implementation Plans, and Order 1320.1D, FAA Directives System.

Charles B. Ochoa
Program Manager for Navigation

TABLE OF CONTENTS

CHAPTER 1. GENERAL

1. PURPOSE. This order provides the Project Implementation Plan (PIP) for the low power Tactical Air Navigation (TACAN) Antenna Systems and presents overall technical guidance and management direction for the orderly implementation of the replacement of RTA-2 TACAN antennas at the respective sites. It identifies activities and schedules required to accomplish this implementation. TACAN facility services are required by the Department of Defense (DOD) throughout the 1990's. Present TACAN antennas are experiencing support problems, which compromise TACAN availability, thus generating this replacement project. Support and cooperation by all involved organizations is essential for successful implementation of the Low Power TACAN Antenna System into the National Airspace System (NAS).

2. DISTRIBUTION. This order is being distributed to branch level in the offices of the Program Directors for Navigation and Landing, Automation, Training and Higher Education, Air Traffic Plans and Requirements, Flight Standards, and the Associate Administrator for Contracting and Quality Assurance; branch level to the FAA Logistics Center at the Aeronautical Center; director level at the FAA Technical Center; branch level to the regional Airway Facilities, Air Traffic, and Flight Standards divisions; and a limited distribution to all Airway Facilities field offices.

3. CANCELLATION. This order cancels Order 6820.13, Project Implementation Plan for Low Power TACAN Antenna, dated July 31, 1991

4. DEFINITIONS. The following acronyms and abbreviations are used in this order:

ACU	Antenna Control Unit
AF	Airway Facilities
APML	Associate Program Manager for Logistics
APMT	Associate Program Manager for Test
ATE	Automatic Test Equipment
BIT	Built-in-test
CCB	Configuration Control Board
CIP	Capital Investment Plan
CM	Configuration Management
CO	Contracting Office
DME	Distance Measuring Equipment
DOD	Department of Defense

DRR	Deployment Readiness Review
DT&E	Development Test & Evaluation
FAA	Federal Aviation Administration
FOB	Freight On Board
FY	Fiscal Year
GFE	Government Furnished Equipment
GFM	Government Furnished Materials
ICDLS	Interim Contractor Depot Logistics Support
ILSP	Integrated Logistics Support Plan
IT&E	Integration Test & Evaluation
JAI	Joint Acceptance Inspection
LRU	Line Replaceable Unit
MT	Mountain Top Facility
NAILS	NAS Integrated Logistics Support
NAS	National Airspace System
NOTAM	Notice to Airmen
ORD	Operational Readiness Demonstration
OT&E	Operational Test & Evaluation
PAT&E	Production Acceptance Test & Evaluation
PIP	Project Implementation Plan
PM	Program Manager
POM	Program Overview Meeting
QRO	Quality Reliability Officer
RF	Radio Frequency
SCU	Speed Control Unit
ST&E	Shakedown Test & Evaluation
TACAN	Tactical Air Navigation System
TIM	Technical Interchange Meeting
TPS	Test Program Set
TSSC	Technical Service Support Contract
UHF	Ultra High Frequency
UUT	Unit Under Test
VOR	VHF Omnidirectional Range
VORTAC	VHF High Frequency Omnidirectional Radio Range and Tactical Air Navigation

5. AUTHORITY TO CHANGE THIS ORDER. The Program Manager for Navigation may issue changes to this order necessary to manage and implement the project which do not affect policy, delegate authority, or assign responsibility.

6.-19. RESERVED.

CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS. The low power TACAN antenna project consists of the procurement of the TACAN antennas as defined in FAA specification FAA-E-2828, TACAN Antenna System. The equipment consists of all the components of a mechanically rotating antenna system including the Antenna Control Unit (ACU). As outlined in Capital Investment Plan (CIP) project 44-12, 203 low power TACAN antennas will be procured to support the replacement of RTA-2 TACAN antennas at 195 sites. Any further quantities will be determined from DOD requirements. The TACAN antenna acquisition project fits into the CIP as follows:

TABLE 2-1. TACAN ANTENNA PROJECT INTERFACE

System	National Airspace System
Element	Ground-to-Air Element
Subelement	VORTAC Systems
Subsystem	2nd Generation VORTAC
Program	Low Power TACAN Antenna System

The following equipment, services, and support are included in this procurement:

a. TACAN antennas in accord with FAA specification FAA-E-2828a.

b. Provisioning technical documentation.

c. Onsite spares.

d. Spare parts-peculiar.

e. Installation kits.

f. Contractor maintenance training for FAA technical personnel.

g. Engineering support services.

h. Maintenance and contractor repair services.

i. Interim contractor depot logistics support.

21. PURPOSE. The purpose of this project is to procure and to install low power TACAN antenna equipment at FAA very high frequency omnidirectional radio range/tactical air navigation (VORTAC) facilities to support DOD's tactical air navigation equipment requirements throughout the 1990's. There are 673 facilities equipped with the RTA-2 antennas. The low power TACAN antenna contract calls for delivery of 203 antenna systems of which 195 will be used for selective replacement of RTA-2 TACAN antennas, and 8 will be used to support depot requirements.

22. HISTORY. The TACAN is a system used primarily by U.S. military aircraft to determine aircraft position by measurement of distance and bearing from a fixed-ground station. The FAA operates TACAN in the NAS in support of military aviation. Each FAA TACAN unit is collocated in a Very High Frequency Omnidirectional Range (VOR) station for purposes of cost reduction and ease of maintenance.

a. The present TACAN antenna population is comprised of mechanically rotating RTA-2 antenna elements that are experiencing support problems which compromise TACAN service availability. This antenna procurement will provide new antennas to be used for the selective replacement of the existing RTA-2 antennas. The RTA-2 antennas were procured in the early 1960's and replacement is now required due to the increasing maintenance and logistics problems and the excessively high electrical power requirements. The new antennas, called the Low-Power TACAN antenna, will enhance the operations and logistics of the antenna system by reducing power requirements and with modification of the TACAN facility equipment will eliminate the need for an engine generator (standby power) source and attendant fuel tanks.

b. On September 6, 1990, JTP Radiation Inc., of Salt Lake City, Utah, was awarded contract DTFA01-90-C-00025 to design, produce, test, and provide engineering support for the replacement TACAN antenna systems. On July 13, 1992, Radiation Systems Inc., of Sterling, VA., purchased contract DTFA01-90-C-00025 from JTP Radiation Inc. The Novation agreement between the FAA and Radiation Systems Inc., was approved on September 4, 1992.

23.-29. RESERVED.

CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION. The TACAN system ground facility is a transmitter-receiver combination used for communicating information to properly equipped aircraft which processes the information to determine the aircraft azimuth and distance to the ground station. The rotating antenna elements modify the signal transmitted from the antenna central array to permit the transmission of azimuth information to the aircraft. Since the antenna central array is common to both the distance and azimuth functions, it receives and transmits all information to and from the aircraft.

a. TACAN is a pulse transmitting system operating in the Ultra-High Frequency (UHF) radio frequency (RF) band - 962 through 1213 MHz. Each system channel requires one air-to-ground frequency and one ground-to-air frequency of one (1) MHz bandwidth, thus allowing only one hundred twenty-six (126) operational channels in the band. To increase the TACAN channel capability, the original frequency band (x-band) was doubled by establishing a y-band mode of operation. Both x- and y-band channels use the same basic operational concepts except in the pulse spacing characteristics. The x-band channels use a 12 microsecond spacing between pulse pairs on both transmission and reception, while the y-band channels use a 30 microsecond spacing between pulse pairs on transmission and 36 microsecond spacing between pulse pairs on reception.

b. TACAN distance measurement is based on time lapse measurement initiated by the airborne equipment interrogating the ground facility equipment by transmitting a pair of pulses with spacing determined by mode of operation (x- or y-band). The ground facility equipment decodes the interrogation pulses and replies by transmitting a pair of pulses with the specific spacing required to satisfy the interrogation code. The ground facility equipment inserts a fixed time delay - decoding and reply time - in replying to an interrogation. The airborne equipment measures the time interval from its interrogation to the receipt of reply pulses, taking into account the fixed time delay of the ground facility equipment, and converts this time to a distance measurement between the aircraft and the ground facility.

c. An aircraft obtains azimuth information by recovery of the two modulated frequency components generated by the ground facility equipment and comparing the phase of the two frequencies with the time interval of the north and auxiliary reference signals transmitted by the ground equipment. One of the

modulation frequencies is 15 Hz and the other is 135 Hz. The two frequencies are synchronized and create a radiation pattern which rotates around the ground facility at a 15 Hz rate. To determine the azimuth of the aircraft from the ground facility, the airborne equipment must measure the phase of both the 15 and 135 Hz and compare them with the fixed reference signals which are transmitted at specific instances during the rotation of the modulated signals. The reference signals are generated at the instant the modulated wave crosses the zero axis going from its minimum to its maximum value. The angular position of the 15 Hz wave with respect to the 15 Hz reference signal measures the azimuth as seen by the aircraft. The 135 Hz signal in conjunction with a 135 Hz reference signal is used to further refine the azimuth measurement.

d. Low power TACAN antennas will replace current RTA-2 antennas; they are unique in that they offer lower electrical power consumption, easier maintainability, overall higher reliability, and they are capable of operating in the 962 to 1213 MHZ frequency band. The low power antenna reduces power requirements from 5,000 watts to 300 watts. This reduction in power consumption, along with some modification of the TACAN facility equipment, will allow the antenna to operate on standby battery power eliminating the requirement for an engine generator standby power source. This would allow the TACAN to provide full service regardless of commercial power outages.

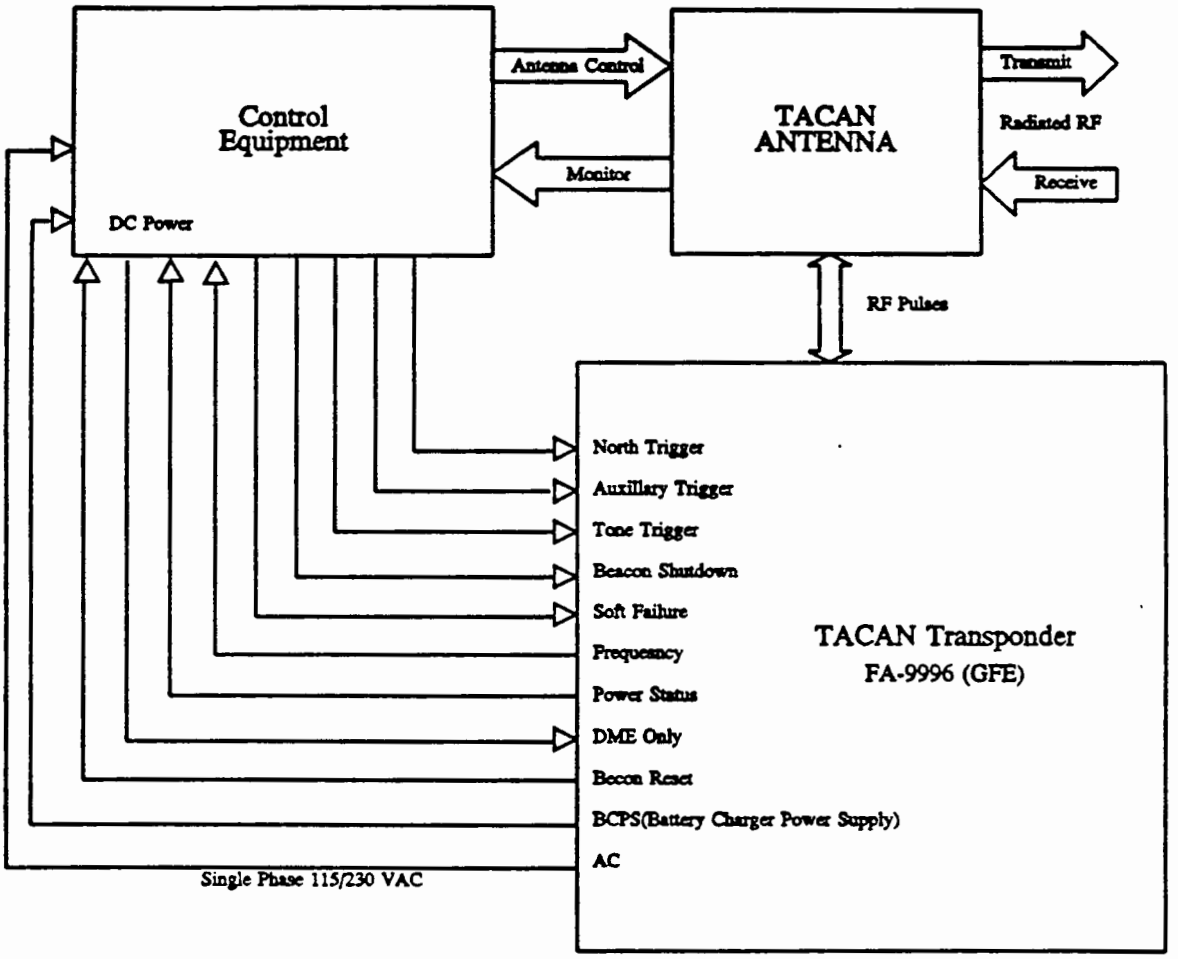
e. Key Functions.

(1) Interfaces. The TACAN antenna system shall interface with the FA-9996 equipment as shown in figure 3-1 and as described in subparagraphs 30e(a) and 30e(b).

(a) Reference Triggers and Identification Signal. These signals originate in the antenna system and are composed of the reference trigger pulses (north and auxiliary trigger pulses) and 1350 Hz identification signals. These signals shall connect to the FA-9996 TACAN equipment via 50 ohm coaxial cable and type BNC connector.

(b) TACAN Shutdown Signal. When an over-speed or lock rotor is detected a system shutdown signal(s) will be developed by the built-in test (BIT) equipment and sent to the FA-9996 TACAN interface. The signals shall provide two separate outputs and shall appear as a "low" at one output and a "high" at the other output.

FIGURE 3-1. TACAN SYSTEM OVERALL FUNCTIONAL BLOCK DIAGRAM



(c) Maintenance Alert Signal. The antenna BIT equipment shall develop an alert signal to the FA-9996 TACAN interface upon detection of a deterioration of the antenna performance. This fault does not cause an error to the radiated TACAN antenna navigational information. Any further degradation of the antenna system will result in a shutdown signal to the FA-9996 TACAN interface. In addition, any time an azimuth error or rotation rate alarm exists the antenna automatically switches to Distance Measuring Equipment (DME) mode and a maintenance alert is generated.

(d) Antenna Reset. An antenna reset signal from the FA-9996 TACAN interface shall be provided to accommodate an antenna reset. This signal will restore the TACAN antenna system to operation after a maintenance alert or shutdown has occurred. The reset command signal is generated by the FA-9996 equipment.

(e) Distance Information Only Mode. The antenna system shall be capable of operation in two modes, TACAN or DME. The antenna system shall enter DME mode upon receipt of a command from the FA-9996 equipment.

31. PHYSICAL DESCRIPTION. The project can be basically described as consisting of replacements of existing established TACAN antennas. The new replacement equipment will be DOD-funded for the purchase and installation of the "low power to spin feature" (300 watts at 36 VDC) antenna. The regions will be requested to utilize as much of the existing cabling as feasible. The contractor furnished antenna equipment will be mounted on the existing antenna mounts.

a. The TACAN antenna will be similar in appearance to the RTA-2. The equipment will be 34.89 inches in diameter, by 120.2 inches in height, with a weight of 325 pounds, and a power consumption of 300 watts at 36 VDC.

b. The ACU equipment will be approximately 19 inches wide by 16.5 inches in depth by 12.25 inches in height with a weight of 65 pounds and a primary power of 115 VAC or battery backup power of 36 VDC.

32. SYSTEM REQUIREMENTS. The Low Power TACAN Antenna System shall be fully compatible with the existing TACAN through-the-air monitoring. The Low-Power TACAN Antenna System is unique in the following ways:

a. The low-power antenna reduces power requirements for the antenna from 5,000 watts to 300 watts.

b. The reduction in power requirements removes the requirement for an engine generator standby power source, thus allowing the antenna to operate on battery backup power to provide continuous service. The modification of TACAN equipment for battery backup capability will be accomplished under the Sustain VOR/VORTAC program, CIP No. 44-14. A study is currently underway to identify the equipment and hardware requirements for this project. Engine generators will be used as the TACAN backup power source until this project is initiated.

33. INTERFACES. The TACAN antenna with the TACAN antenna monitor is an integral part of the TACAN system.

34.-39. RESERVED.

CHAPTER 4. PROJECT SCHEDULE AND STATUS

40. PROJECT SCHEDULES AND GENERAL STATUS. The TACAN antenna equipment procurement will provide systems for delivery starting with the first test site in June 1993 and ending May 1995.

41. MILESTONE SUMMARY SCHEDULE. The current project schedule is shown in Table 4-1, Project Milestone Summary Schedule. Project events schedule are in relationship to the date of contract award. The dates listed are for those milestones completed or anticipated. This table is by no means an all inclusive list of project milestones necessary for project completion.

TABLE 4-1. PROJECT MILESTONE SUMMARY SCHEDULE

Event	Date
Contract Award	September 27, 1990
Preliminary Design Review	March 12, 1991
Critical Design Review	July 25, 1991
First System Delivered to Test and Evaluation Site	June 1993
First System Delivered to Operational Site	June 1993
Last System Delivered to Operational Site	May 1995

Table 4-2 reflects the TACAN antenna delivery dates and associated site locations as of April 1993. The most current schedule can be obtained from the project office.

Table 4-2. TACAN ANTENNA DELIVERY SCHEDULE

SYS#	IDENT	MT+	LOCATION	STATE	RGN	DEL-DATE++	SS+++
1	-		FAA Tech Center	NJ	TC	Jun 03, 1993	0
2	VUH		Galveston	TX	ASW	Jun 11, 1993	1
3	-		Oklahoma Academy	OK	AAC	Aug 31, 1993	0
4	-		Oklahoma AOS-200	OK	AAC	Aug 31, 1993	0
5	-		Oklahoma Depot	OK	AAC	Aug 31, 1993	1
6	TLH		Tallahassee	FL	ASO	Aug 31, 1993	1
7	LNY	MT	Lanai	HI	AWP	Aug 31, 1993	1
8	OTT	MT	Nottingham	MD	AEA	Aug 31, 1993	1
9	BDL		Windsor Locks	CT	ANE	Aug 31, 1993	1
10	BLI		Bellingham	WA	ANM	Sep 30, 1993	1
11	ANN		Annette Island	AK	AAL	Sep 30, 1993	1
12	MZB		Mission Bay	CA	AWP	Sep 30, 1993	1
13	BLF	MT	Bluefield	WV	AEA	Sep 30, 1993	1
14	PQI		Presque Isle	ME	ANE	Sep 30, 1993	1
15	DFW		Dallas Ft Worth	TX	ASW	Oct 28, 1993	1
16	BKA	MT	Biorka Island	AK	AAL	Oct 28, 1993	1
17	OBH		Wolbach	NE	ACE	Oct 28, 1993	1
18	GTK		Grand Turk	CB	ASO	Oct 28, 1993	1
19	JOH		Johnston Point	AK	AAL	Oct 28, 1993	1
20	TUS		Tuscon	AZ	AWP	Oct 28, 1993	1
21	AUW		Wausau	WI	AGL	Nov 30, 1993	1
22	ONL		O'Neill	NE	ACE	Nov 30, 1993	0
23	ILC	MT	Wilson Creek	NV	AWP	Nov 30, 1993	1
24	AXN		Alexandria	MN	AGL	Nov 30, 1993	1
25	IDU		Industry	TX	ASW	Nov 30, 1993	1
26	ZBV		Bimini	BH	ASO	Nov 30, 1993	1
27	MLT		Millinocket	ME	ANE	Dec 30, 1993	0
28	LEV		Leeville	LA	ASW	Dec 30, 1993	1
29	BQN		Borinquen	PR	ASO	Dec 30, 1993	1
30	FJS	MT	Fort Jones	CA	AWP	Dec 30, 1993	1
31	HQM		Ocean Shores	WA	ANM	Dec 30, 1993	0
32	BJI		Bemidji	MN	AGL	Dec 30, 1993	0
33	RSG		Rock Springs	TX	ASW	Jan 31, 1994	1
34	OLM		Olympia	WA	ANM	Jan 31, 1994	0
35	SJN		St Johns	AZ	ASW	Jan 31, 1994	1
36	SJU		San Juan	PR	ASO	Jan 31, 1994	0
37	MGW	MT	Morgantown	WV	AEA	Jan 31, 1994	1
38	BAF		Westfield	MA	ANE	Jan 31, 1994	0
39	BSY		Biscayne Bay	FL	ASO	Jan 31, 1994	1
40	MKC		Kansas City	MO	ACE	Jan 31, 1994	1
41	BLD		Boulder City	NV	AWP	Jan 31, 1994	0
42	BQU	MT	Bullion	NV	AWP	Jan 31, 1994	0

\+ Mountain Top Location
++ Estimated
+++ Site Spares

SYS#	IDENT	MT+	LOCATION	STATE	RGN	DEL-DATE++	SS+++
43	HLG		Wheeling	WV	AEA	Jan 31, 1994	0
44	CGT		Chicago Heights	IL	AGL	Jan 31, 1994	1
45	RHI		Rhinelander	WI	AGL	Feb 28, 1994	0
46	BFM		Brookley AFB	AL	ASO	Feb 28, 1994	1
47	OSH		Oshkosh	WI	AGL	Feb 28, 1994	0
48	SDO		Sod House	NV	AWP	Feb 28, 1994	0
49	RBS		Roberts	IL	AGL	Feb 28, 1994	0
50	-		Oklahoma Depot	OK	AAC	Feb 28, 1994	0
51	CMI		Champaign	IL	AGL	Feb 28, 1994	1
52	SJI		Semmes	AL	ASO	Feb 28, 1994	0
53	SXC	MT	Santa Catalina	CA	AWP	Feb 28, 1994	1
54	RAV		Ravine	PA	AEA	Feb 28, 1994	1
55	HFD	MT	Hartford	CT	ANE	Feb 28, 1994	0
56	DNV		Danville	IL	AGL	Feb 28, 1994	0
57	AGC		Allegheny	PA	AEA	Mar 31, 1994	0
58	TBD		Thibodaux	LA	ASW	Mar 31, 1994	0
59	JCT		Junction	TX	ASW	Mar 31, 1994	0
60	LFK		Lufkin	TX	ASW	Mar 31, 1994	0
61	ANX		Napoleon	MO	ACE	Mar 31, 1994	0
62	MON		Monticello	AR	ASW	Mar 31, 1994	0
63	MCG		McGrath	AK	AAL	Mar 31, 1994	1
64	BCE	MT	Bryce Canyon	UT	ANM	Mar 31, 1994	1
65	IPT		Williamsport	PA	AEA	Mar 31, 1994	1
66	BKE		Baker City	OR	ANM	Mar 31, 1994	1
67	CTW	MT	Newcomerstown	OH	AGL	Mar 31, 1994	1
68	HLV		Hallsville	MO	ACE	Mar 31, 1994	1
69	GAL		Galena	AK	AAL	Apr 28, 1994	1
70	VTU	MT	Ventura	CA	AWP	Apr 28, 1994	1
71	BOI		Boise	ID	ANM	Apr 28, 1994	0
72	ELD		El Dorado	AR	ASW	Apr 28, 1994	1
73	FIM	MT	Fillmore	CA	AWP	Apr 28, 1994	0
74	CMX		Houghton	MI	AGL	Apr 28, 1994	1
75	CTY		Cross City	FL	ASO	Apr 28, 1994	1
76	ANY		Anthony	KS	ACE	Apr 28, 1994	1
77	GVO	MT	Gaviota	CA	AWP	Apr 28, 1994	0
78	BVL		Bonneville	UT	ANM	Apr 28, 1994	1
79	HLN		Helena	MT	ANM	Apr 28, 1994	1
80	EON		Peotone	IL	AGL	Apr 28, 1994	0
81	BTR		Baton Rouge	LA	ASW	May 31, 1994	0
82	ESC		Escanaba	MI	AGL	May 31, 1994	0
83	BSR	MT	Big Sur	CA	AWP	May 31, 1994	1
84	VIH		Vichy	MO	ACE	May 31, 1994	0
85	CAM	MT	Cambridge	NY	AEA	May 31, 1994	1
86	FDY		Findlay	OH	AGL	May 31, 1994	0

\+ Mountain Top Location
++ Estimated
+++ Site Spares

SYS#	IDENT	MT+	LOCATION	STATE	RGN	DEL-DATE++	SS+++
87	COT		Cotulla	TX	ASW	May 31, 1994	0
88	JLI	MT	Julian	CA	AWP	May 31, 1994	0
89	IAH		Humble	TX	ASW	May 31, 1994	0
90	DNJ		McCall (Donnelly)	ID	ANM	May 31, 1994	0
91	ICT		Wichita	KS	ACE	May 31, 1994	0
92	CMK		Carmel	NY	AEA	May 31, 1994	1
93	DTA		Delta	UT	ANM	Jun 30, 1994	0
94	IMT		Iron Mountain	MI	AGL	Jun 30, 1994	0
95	STV		Stonewall	TX	ASW	Jun 30, 1994	1
96	OCF		Ocala	FL	ASO	Jun 30, 1994	0
97	TAS		Taos	NM	ASW	Jun 30, 1994	0
98	PFN		Panama City	FL	ASO	Jun 30, 1994	0
99	FFU	MT	Fairfield	UT	ANM	Jun 30, 1994	0
100	-		Oklahoma Depot	OK	AAC	Jun 30, 1994	0
101	LRP		Lancaster	PA	AEA	Jun 30, 1994	0
102	ARG		Walnut Ridge	AR	ASW	Jun 30, 1994	0
103	GNV		Gainesville	FL	ASO	Jun 30, 1994	0
104	AQN		Acton	TX	ASW	Jun 30, 1994	0
105	GEF		Greenville	FL	ASO	Jul 28, 1994	0
106	UNZ	MT	Nimitz	GU	AWP	Jul 28, 1994	1
107	GTF		Great Falls	MT	ANM	Jul 28, 1994	0
108	GRI		Grand Island	NE	ACE	Jul 28, 1994	0
109	UPP	MT	Upolu Point	HI	AWP	Jul 28, 1994	1
110	GCV		Greene County	MS	ASO	Jul 28, 1994	0
111	BKW		Beckley	WV	AEA	Jul 28, 1994	0
112	MKK		Moloaki	HI	AWP	Jul 28, 1994	1
113	JOT		Joliet	IL	AGL	Jul 28, 1994	0
114	CIM	MT	Cimarron	NM	ASW	Aug 31, 1994	0
115	HCT		Hayes Center	NE	ACE	Aug 31, 1994	1
116	TUT		Pago Pago	AQ	AWP	Aug 31, 1994	1
117	APN		Alpena	MI	AGL	Aug 31, 1994	1
118	GFL		Glens Falls	NY	AEA	Aug 31, 1994	0
119	CKH	MT	Koko Head	HI	AWP	Aug 31, 1994	1
120	AUS		Austin	TX	ASW	Aug 31, 1994	1
121	PCU		Picayune	MS	ASO	Aug 31, 1994	1
122	ABB		Nabb	IN	AGL	Aug 31, 1994	1
123	GPT		Gulfport	MS	ASO	Sep 29, 1994	0
124	LBF		North Platte	NE	ACE	Sep 29, 1994	0
125	LCU		Lucin	UT	ANM	Sep 29, 1994	0
126	HAR		Harrisburg	PA	AEA	Sep 29, 1994	0
127	EYW		Key West	FL	ASO	Sep 29, 1994	0
128	PUB		Pueblo	CO	ANM	Sep 29, 1994	0
129	PBI		West Palm Beach	FL	ASO	Sep 29, 1994	1
130	LDN		Linden	VA	AEA	Sep 29, 1994	1

\+ Mountain Top Location
++ Estimated
+++ Site Spares

SYS#	IDENT	MT+	LOCATION	STATE	RGN	DEL-DATE++	SS+++
131	HPW		Hopewell	VA	AEA	Sep 29, 1994	0
132	COS		Colorado Springs	CO	ANM	Oct 31, 1994	1
133	MAP		Maples	MO	ACE	Oct 31, 1994	0
134	OKK		Kokomo	IN	AGL	Oct 31, 1994	0
135	PGY	MT	Poggi	CA	AWP	Oct 31, 1994	0
136	HNN		Henderson	WV	AEA	Oct 31, 1994	0
137	LBY		Eaton	MS	ASO	Oct 31, 1994	0
138	ALB		Albany	NY	AEA	Oct 31, 1994	0
139	MLF		Milford	UT	ANM	Oct 31, 1994	0
140	IGN	MT	Kingston	NY	AEA	Oct 31, 1994	0
141	MXW		Maxwell	CA	AWP	Nov 30, 1994	0
142	LVL		Lawrenceville	VA	AEA	Nov 30, 1994	0
143	MIP		Milton	PA	AEA	Nov 30, 1994	0
144	RID		Richmond	IN	AGL	Nov 30, 1994	0
145	TBE		Tobe	CO	ANM	Nov 30, 1994	0
146	PWL	MT	Pawling	NY	AEA	Nov 30, 1994	0
147	HAB		Hamilton	AL	ASO	Nov 30, 1994	1
148	MSL		Muscle Shoals	AL	ASO	Nov 30, 1994	0
149	RQZ		Huntsville	AL	ASO	Nov 30, 1994	0
150	AIR	MT	Bellaire	OH	AGL	Dec 29, 1994	0
151	ROW		Roswell	NM	ASW	Dec 29, 1994	0
152	DHT		Dalhart	TX	ASW	Dec 29, 1994	1
153	FLW	MT	Fellows	CA	AWP	Dec 29, 1994	1
154	FQF		Falcon	CO	ANM	Dec 29, 1994	1
155	CID		Cedar Rapids	IA	ACE	Dec 29, 1994	1
156	SCY		Scurry	TX	ASW	Dec 29, 1994	1
157	GLD		Goodland	KS	ACE	Dec 29, 1994	1
158	CCC		Calverton	NY	AEA	Dec 29, 1994	1
159	JAX		Jacksonville	FL	ASO	Jan 31, 1995	1
160	TDT		Tidioute	PA	AEA	Jan 31, 1995	1
161	SSR	MT	Sisters Island	AK	AAL	Jan 31, 1995	1
162	CDB	MT	Cold Bay	AK	AAL	Jan 31, 1995	1
163	GFS		Goffs	CA	AWP	Jan 31, 1995	1
164	LNK		Lincoln	NE	ACE	Jan 31, 1995	1
165	MHT		Manchester	NH	ANE	Jan 31, 1995	1
166	BGS		Big Springs	TX	ASW	Jan 31, 1995	1
167	BRL		Burlington	IA	AGL	Jan 31, 1995	1
168	HIC		White Cloud	MI	AGL	Feb 28, 1995	1
169	PDT		Pendleton	OR	ANM	Feb 28, 1995	1
170	SEA		Seattle	WA	ANM	Feb 28, 1995	1
171	DWM		Darwin	MN	AGL	Feb 28, 1995	1
172	MIA		Miami	FL	ASO	Feb 28, 1995	1
173	LHY	MT	Lake Henry	PA	AEA	Feb 28, 1995	1
174	ILM		Wilmington	NC	ASO	Feb 28, 1995	1

\+ Mountain Top Location
++ Estimated
+++ Site Spares

SYS#	IDENT	MT+	LOCATION	STATE	RGN	DEL-DATE++	SS+++
175	BGD		Borger	TX	ASW	Feb 28, 1995	0
176	GMN	MT	Gorman	CA	AWP	Feb 28, 1995	0
177	CKW		Cherokee	WY	ANM	Mar 31, 1995	0
178	IOW		Iowa City	IA	ACE	Mar 31, 1995	0
179	BUJ		Blue Ridge	TX	ASW	Mar 31, 1995	0
180	HLC		Hill City	KS	ACE	Mar 31, 1995	0
181	DPK		Deer Park	NY	AEA	Mar 31, 1995	0
182	TAY		Taylor	FL	ASO	Mar 31, 1995	0
183	ERI		Erie	PA	AEA	Mar 31, 1995	0
184	YAK		Yakutat	AK	AAL	Mar 31, 1995	0
185	AKN		King Salmon	AK	AAL	Mar 31, 1995	0
186	MMM		Mormon Mesa	NV	AWP	Apr 30, 1995	1
187	GDM		Gardner	MA	ANE	Apr 30, 1995	0
188	MAF		Midland	TX	ASW	Apr 30, 1995	0
189	MZY		Moline	IL	AGL	Apr 30, 1995	0
190	MKG		Muskegon	MI	AGL	Apr 30, 1995	0
191	YKM		Yakima	WA	VFM	Apr 30, 1995	0
192	TOU	MT	Neah Bay	WA	ANM	Apr 30, 1995	0
193	EAU		Eau Claire	WI	AGL	Apr 30, 1995	0
194	PHK		Pahokee	FL	ASO	Apr 30, 1995	0
195	AVP		Wilkes-Barre	PA	AEA	May 31, 1995	0
196	CRE		Myrtle Beach	SC	ASO	May 31, 1995	0
197	LHS	MT	Lake Hughes	CA	AWP	May 31, 1995	0
198	EEN	MT	Keene	NH	ANE	May 31, 1995	0
199	-		Oklahoma Depot	OK	AAC	May 31, 1995	5
200	-		Oklahoma Depot	OK	AAC	May 31, 1995	0
201	-		Oklahoma Depot	OK	AAC	May 31, 1995	0
202	-		Oklahoma Depot	OK	AAC	May 31, 1995	0
203	-		Oklahoma Depot	OK	AAC	May 31, 1995	0

\+ Mountain Top Location
++ Estimated
+++ Site Spares

42. INTERDEPENDENCIES AND SEQUENCE. Not applicable.

43.-49. RESERVED.

CHAPTER 5. PROJECT MANAGEMENT

50. PROJECT MANAGEMENT, GENERAL. This chapter describes the organizations within the Office of the Associate Administrator for NAS Development (AND) that are directly responsible for Low Power TACAN Antenna program management.

a. Associate Administrator. The Associate Administrator's office manages, directs, and executes the FAA's engineering and management activities related to facilities design, air navigation, landing aids, and air traffic control facilities and equipment to ensure that the NAS is efficient, economical, and responsive to operational needs.

b. Navigation and Landing Program (ANN-1). This organization is the principal element within the Office of the Associate Administrator responsible for the development and implementation of systems, programs, and facilities requirements for navigation and landing systems.

c. Navigation Program (ANN-300). This organization is the principal element of ANN-1 responsible for design, procurement, and implementation responsibilities for aids to navigation. The program manager is supported by matrix organizations which are essential to successfully accomplish the elements of their charter which are:

(1) The program manager (PM) is responsible for the overall management and direction of all FAA activities necessary for successful development, acquisition, production, test and evaluation, transition to user organization, and engineering support of the navigation support.

(2) The PM is responsible for the definition of program needs for the navigation program. This includes definition of tasks to be performed and expected results, staffing estimates, contract cost estimates, budget estimates, schedules, management procedures and controls, and required equipment and facilities.

(3) Establishes matrix support agreements and holds functional organizations accountable for integrated logistics support, facilities planning, production quality and planning, test and integration, contracting, and legal.

(4) Ensures timely preparation and submission of reports relative to established cost, schedule, benefit, and budget baseline to higher authority.

(5) Serves as the liaison with the DOD and the military departments for joint acquisition and life-cycle support of assigned systems.

d. Low Power TACAN Antenna Program. The low power TACAN project manager is responsible for the day-to-day management of the TACAN antenna program from inception to facility commissioning. The project manager's responsibilities include:

(1) Management. Planning, scheduling, managing from budget submission to development of procurement documentation through contract award, system deployment, and commissioning.

(2) Logistics Support. Provides, in conjunction with the National Airspace Integrated Logistics Support Management Team (NAILSMT), technical guidance to define logistic support requirements, including provisioning, training, and documentation through contract award, system deployment, and commissioning.

(3) Technical Officer. Providing engineering support, advice, and consultation to the contracting officer during procurement and contract management.

(4) Testing. Takes the lead in the review, coordination, and approval of the contractor's proposed testing program. Coordinates with other responsible organizations in the development, review, and approval of test procedures designed to demonstrate total NAS deployment acceptability of the low power TACAN antenna system.

51. PROJECT CONTACTS. This paragraph lists TACAN antenna project contacts and their routing symbols and telephone numbers

a. Program Director. Rodman Gill, ANN-1, FTS-267-6595.

b. Program Manager. Charles Ochoa, ANN-300, FTS-267-6601.

c. Project Manager. Joel Petersen, ANN-130, FTS-267-6530.

52. PROJECT COORDINATION. The Low Power TACAN Antenna Program requires coordination with other headquarters organizations, with regional airway facilities personnel, and with the prime contractor. Coordination with the organizations listed in subparagraphs 52a - 521 is essential for proper management of the Low Power TACAN Antenna Program.

a. Maintenance Engineering Division (ASM-100). ASM-100 is responsible for the formulation and coordination of national objectives, policies, standards, procedures and guidelines

governing the day-to-day and long-term technical functioning, performance, and certification of the NAS and technical inspection of field support facilities.

b. Maintenance Operations Division (ASM-200). ASM-200 is responsible for development of maintenance requirements for the NAS. The division is also responsible for the formulation and coordination of policies, standards and guidelines governing technical training, personal certification, position classification, field organization, and field staffing requirements.

c. National Airway Systems Engineering Division (AOS-200). AOS-200 prepares the shakedown test and evaluation (ST&E) requirements and test plans and conducts the ST&E on the first low power TACAN antenna system. After system deployment, they are responsible for national documentation, equipment instruction book changes, equipment modifications and field engineering support.

d. Communications/Navigation/Surveillance Division (ACW-300). ACW-300 will supply an Associate Program Manager for Test (APMT) with the roles and responsibilities defined in FAA Order 1810.4B. The APMT will oversee Development Test & Evaluation (DT&E), Operational Test & Evaluation (OT&E), and initial Production Acceptance Test & Evaluation (PAT&E) testing and serve as the program manager's focal point for project testing. The APMT will review, monitor, and report on contractor DT&E activities, prepare, conduct, and report on OT&E Integration and Operational testing, and review and monitor OT&E Shakedown activities. The APMT will ensure that all testing requirements are met. In addition, the APMT will prepare the Master Test Plan in coordination with the PM.

e. NAS Support Division (ASM-700). ASM-700 develops, recommends, and issues agency procedures, standards, and policies for material supply and property management.

f. Contracts Division (ASU-300). ASU-300 performs cost/price analyses of contractor's proposals and participates as member of the Source Evaluation Board. In addition, ASU-300 provides procurement support for the low power TACAN antenna program and plans, places, and administers contracts for the low power TACAN antenna equipment. ASU-300 also designates a contracting officer (CO) who is responsible for all contractual matters. The CO is the only individual authorized to approve contract changes impacting price, delivery, or schedule.

g. Industrial Division (ASU-400). ASU-400 performs factory inspection of the low power TACAN antenna equipment. ASU-400 assigns a quality reliability officer (QRO) at the time the contract is awarded. The QRO is the FAA representative at the contractor's facility and is responsible for verifying quality control. The QRO is directed by FAA policy and procedure, and by the terms and conditions of the contract.

h. FAA Academy (AMA-1). AMA-1 provides maintenance training and coordinates with ASM-200 in the development of a training plan.

i. Technical Training Division (AHT-400). AHT-400 analyzes training proposals prepared by ASM-200 and initiates action to meet training requirements.

j. FAA Aviation Standards National Field Office. The FAA Aviation Standards National Field Office is responsible for conducting flight inspections of the TACAN systems needed to accomplish the following functions.

(1) Determining if the operational status of a facility or system is in accordance with the established tolerances.

(2) Certifying the facility or system for operational use in the NAS when all operational requirements have been met.

(3) When applicable, ensuring that required Notices to Airmen (NOTAM) are issued for any facility or system restriction.

k. FAA Regional Offices. The FAA regional offices, through established administrative structures, coordinate with all responsible parties to assure adequate funding, establish system commissioning/service availability dates, assign project field representatives for the low power TACAN antenna system. The regions also provide field engineering as required to support preparations for the installation of the low power TACAN equipment; order Government Furnished Material (GFM) for tools to support the TACAN antenna installation and acceptance; tailor installation drawings to site specific; initiate work orders and travel authorization; and assign field personnel. The following regional offices are responsible for the coordination required to accomplish the following functions.

(1) Regional Airway Facilities (AF) Divisions.

(a) Installing facilities systems and equipment in accordance with established standards, specifications, and instructions.

(b) Notifying the appropriate sector that a project has been funded and issuing a projected implementation schedule.

(c) Providing the sector an opportunity to review and participate in project plans during the engineering phase and for furnishing the sector a copy of the engineering plans and contract documents.

(d) Providing the sector a copy of the project work order at least 10 days before the start of project work.

(e) Providing the appropriate facility reference data file (FRDF) information to the sector for inclusion in the FRDF. These data requirements will be established by the National Engineering Field Support Division, AOS-200, as part of ST&E.

(f) Notifying the joint acceptance inspection (JAI) board chairman of when the facility will be ready for JAI, providing the sector all data necessary to prepare warranty failure reports on items failing prior to JAI, and providing regional Airway Facilities division representatives for participation in the JAI.

(g) Establishing and maintaining a follow-up file for monitoring and clearing all JAI report exceptions, reviewing all JAI reports and follow-up reports for correctness, completeness and proper distribution, taking appropriate and timely actions to clear JAI report exceptions, and identifying additional sources of funds or initiating budgetary action, as necessary, to clear exceptions.

(2) Airway Facilities Sector.

(a) Reviewing contract documents and engineering plans during the engineering phase and providing comments to the regional Airway Facilities division.

(b) Providing personnel, as required, at appropriate times throughout the project to witness and/or participate in construction, installation, tune-up, tests, and collection of technical reference data.

(c) Providing a representative to serve as the joint acceptance board chairperson and other qualified personnel for participation in the JAI, preparing and distributing the JAI report, and assuming maintenance responsibilities and custodianship for facilities, systems, or equipment at the conclusion of JAI.

(d) Coordination and follow-up on exceptions after the JAI, clearing exceptions which have been assigned to the sector, reporting the clearance of exceptions, and reviewing all waived exceptions to determine if actions will impact sector operations or other organizations.

(e) Maintaining all equipment warranty information and reporting equipment failing under warranty.

(f) Receiving, storing, and shipping project materials and disposing of excess equipment and materials.

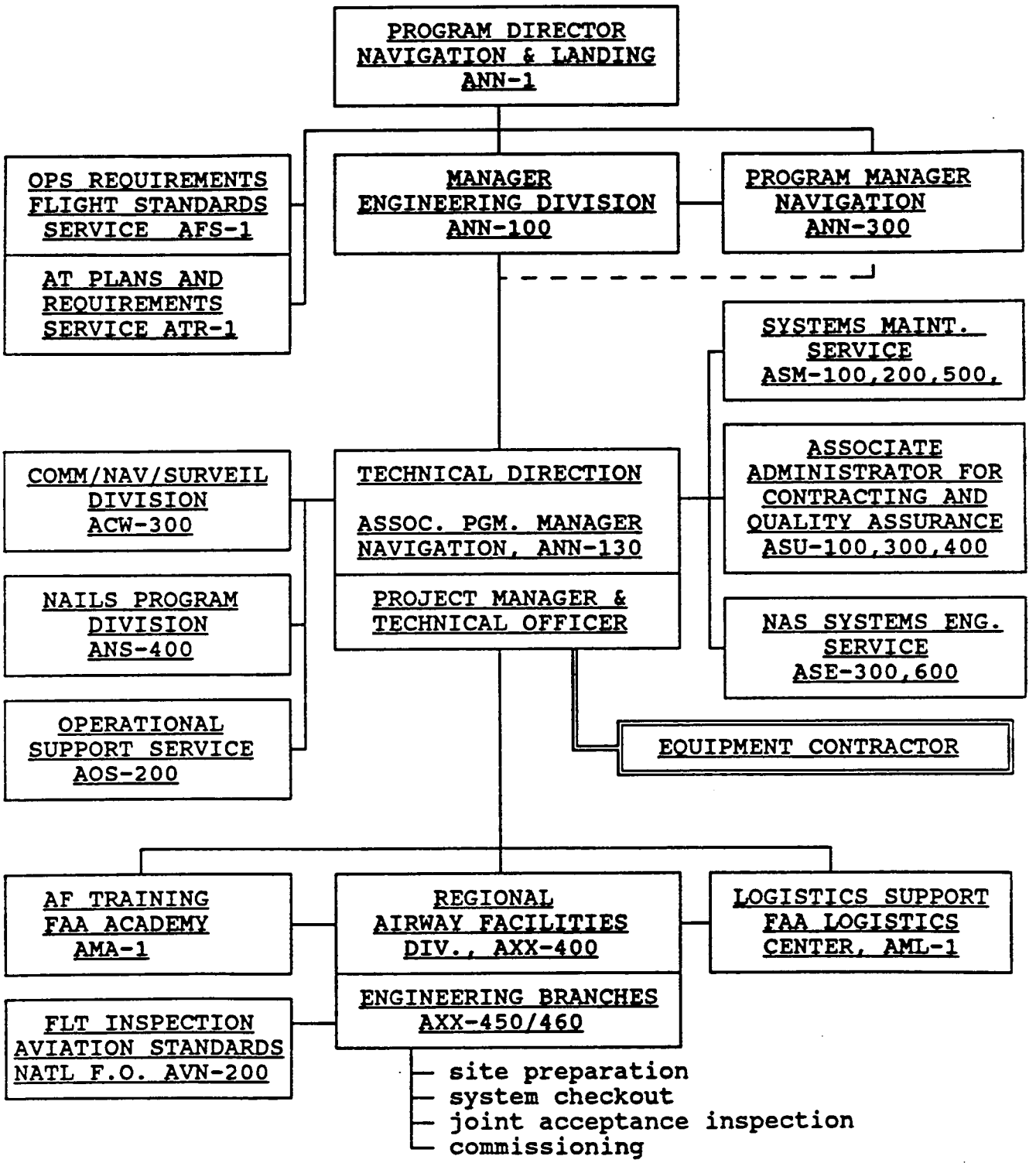
1. NAILS Program Division. The Nails Program Division, ANS-400, is responsible for NAILS policy, plans and implementation. ANS-400 appoints an Associate Program Manager for Logistics (APML) who is responsible for ensuring that the NAILS program identifies and provides system life cycle support for the TACAN antenna, chairs NAILS Management Team meetings, develops the Integrated Logistics Support Plan, participates in program reviews, design reviews and technical interchange meetings, and provides oversight of NAILS program progress.

53. PROJECT RESPONSIBILITY MATRIX. Figures 5-1 illustrates the FAA organizations responsible for the implementation of each significant function of the LOW POWER TACAN ANTENNA project.

54. PROJECT MANAGERIAL COMMUNICATIONS. The TACAN antenna project manager within ANN-130 is the focal point for all technical project communication. Organizations supporting the TACAN antenna project designate a representative to maintain close communication with the TACAN Antenna System Program Office. Supporting organizations maintain communications within the FAA but never directly with the contractor without the CO's permission. The meetings listed in subparagraphs 54a-54d are the regularly scheduled project meetings or conferences.

a. The National Airspace Integrated Logistics Support (NAILS) Conferences. These conferences are held to ensure that there is an interrelated, unified, and iterative approach to the managerial and technical activities which support the NAS. During these conferences issues affecting logistics management, maintenance planning, supply support, test and support equipment, manpower and training support, support facilities, technical data, and packing, handling, storage and transportation are discussed and resolved. These meetings can be held at FAA headquarters, FAA Logistics Center, or contractor facility on an annual basis.

FIGURE 5-1. PROJECT RESPONSIBILITY MATRIX



b. Program Directors Status Review Board. These meetings are held on a monthly basis at the FAA headquarters to discuss project status and to resolve problems and issues effecting all phases of the project from the time that the requirements are established until system deployment has been completed.

c. Program Overview Meetings (POM). The contractor shall conduct quarterly POM's at the contractor's facility beginning at the post award conference and ending at acceptance of the final system under contract. The purpose of the POM's shall be for the contractor to present a detailed contract status, to track outstanding action items, review potential and actual technical and programmatic problem areas and to evaluate performance with respect to milestones presented in the Program Management Plan.

d. Technical Interchange Meetings (TIM). The Government may request a monthly TIM between the contractor and the technical officer or designated representatives. The purpose of these TIM's is to surface, discuss, and resolve through mutual agreement any technical, schedule, or programmatic issues associated with the low power TACAN antenna contract.

55. IMPLEMENTATION STAFFING. There are no requirements peculiar to the implementation phase of the project.

56. PLANNING AND REPORTS. No scheduled reports are required for this project.

57. APPLICABLE DOCUMENTS. The following documents have been referenced in this order.

a. FAA-E-2828a, TACAN Antenna System, January 1990.

b. FAA-G-2100e, Electronic Equipment, General Requirements, March 1987.

c. Order 6030.45A, Facility Reference Data File, December, 1992.

d. Order 6820.7A, Maintenance of Navigational Aids Facilities and Equipment - VOR,VOR/DME,VORTAC, October 1988.

e. Order 8200.1, United States Flight Inspection Manual, July 1965 - with 46 changes.

f. Order 1810.4B, FAA NAS Test and Evaluation Policy, October 1992.

58.-59. RESERVED.

CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. Project funding for the low power TACAN antenna has been provided as follows:

a. The first 119 systems have been funded by DOD.

b. Two options consisting of 84 systems have been funded by the FAA.

c. A second procurement may come from future budget years, depending on DOD requirements.

61.-69. RESERVED.

CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. Deployment of the Low Power TACAN Antenna Systems is administered by the FAA PM and staff. The equipment will be shipped Freight On Board (FOB) destination to a location designated by FAA regional personnel. The region should make preparations to provide storage (if necessary). The low power TACAN antennas will be shipped as an entire system to the site or storage facility where it will await installation. Installation of the equipment is the responsibility of the region. Table 7-1 depicts the low power TACAN antenna Deployment Readiness Review (DRR) Schedule.

TABLE 7-1. LOW POWER TACAN ANTENNA DRR SCHEDULE

Event	Date
Delivery to T&E Site	06/93
Shakedown Testing Complete	07/93
Ops. Test & Eval(OT&E) Complete	07/93
Final Report to Assoc. Admin	08/93
EXCOM Meeting	08/93

71. SITE PREPARATION. The regions are responsible for preparing the sites where the low power TACAN antenna equipment will be installed. Site preparation includes planning for installation and integration with other interrelated subsystems.

72. DELIVERY. TACAN antenna equipment will be delivered to the locations designated by FAA regional personnel. Implementation of the project is scheduled to be completed in July 1995.

73. INSTALLATION PLAN. The FAA regions shall coordinate the receipt, installation, and evaluation of all equipment required to support the low power TACAN antenna implementation. The antenna shall be installed in accordance with national standard drawings and standards revised to fit the individual site. The regional office shall coordinate the complete installation, alignment, and operational tests on all identified TACAN antenna interfaces to assure full compliance with FAA specifications and performance. If required, the contractor shall be available to provide engineering support services for onsite advice, including technical supervision to FAA technicians or, if applicable, Technical Service Support Contractor (TSSC).

A set of installation drawings, compatible with MIL-STD-1000B, will be provided with each system. A contractual modification is being considered which will require delivery of all installation drawings in a computer-aided engineering graphics format on magnetic media.

Mounting the TACAN antenna on top of the shelter will require a crane and a special sling, which is provided with the antenna. A 4 foot bubble level will also be required to check leveling requirements. A set of leveling rings will be supplied to make necessary adjustments. No other special tools or test equipment is required for system installation.

A mounting plate with a bolt-hole pattern compatible with the top plate of the VORTAC mounting fixture will be provided with the low power TACAN antenna. The VORTAC top-mounting fixture is the standard fixture required at each site; it is not provided with the low power TACAN antenna.

The antenna control unit (ACU) will fit in a standard 19-inch rack. It will be necessary to install a chassis slide adapter, included with the installation kit, which is used to attach the rear of each slide rail to the equipment rack. The front ends of the slide rails are bolted directly to the rack face. The speed control unit (SCU) is mounted in the antenna pedestal and needs no rack space.

The RTA-2 TACAN Antenna Technical Instruction Books and Appendix 1 should be used as guidelines during removal and disposition of existing equipment.

74. CONFIGURATION MANAGEMENT PLAN. Configuration Management (CM) is the process used to identify and document the functional and physical characteristics of a configuration item, control changes to those characteristics, and record and report change processing and implementation status. The CM discipline shall be applied to all configuration items included in the TACAN antenna baseline to ensure compatibility between elements within the TACAN antenna. All additions and changes to the TACAN antenna baseline shall be proposed in the form of a case file, and shall be reviewed for recommended approval or disapproval by a Configuration Control Board (CCB). All changes to the NAS site design baseline must be processed and approved by the Navigation and Landing Monitoring Cluster (ANN-100) CCB.

a. Acquisition Phase Configuration Management. The Navigation and Landing Monitoring Cluster (ANN-100) CCB controls the establishment of and changes to the TACAN antenna hardware baseline during the acquisition phase. For TACAN antenna

matters, the ANN-100 CCB will include members from AOS-200, ASM-500, ASM-100, ASE-100, ASE-210, ACW-300, AVN-200, and the Configuration Management Division, ASE-620. The ANN-100 CCB is responsible for ensuring that the functional, performance, and interface requirements allocated to the TACAN antenna hardware subsystems are reflected in the baseline, and in any changes to those baseline until product acceptance. The ANN-100 CCB is also responsible for ensuring that baseline documentation is accurate and reflects the TACAN antenna operational requirements per the baseline specification documentation.

The transition of CM responsibilities associated with TACAN antenna hardware products occurs at acceptance by the ASM-100 CCB designated representative of the contractor's delivered, installed, integrated, and tested hardware product. Hardware product acceptance is based on successful operational readiness demonstration (ORD) of the complete Low Power TACAN Antenna System. The ASM-100 CCB retains this CM responsibility throughout the TACAN antenna life cycle.
At product acceptance, the change control functions and CCB records associated with hardware products that effect the product baseline drawings and instruction books, transition from the ANN-100 CCB to the Maintenance Engineering (ASM-100) CCB.

b. Operational Support Phase Configuration Management. During the operational support phase, and for the entire life-cycle of the implemented hardware enhancements, CM functions will consist of maintenance and change control management of site as well as product baseline (Level III Design). The ASM-100 CCB assumes baseline and change control management of all low power TACAN antenna installations as they are commissioned for operational service and of related NAS site design baseline (including logistics and training). The ASM-100 CCB is responsible for change control management of the low power TACAN antenna hardware product baseline. Hardware product baseline are maintained by National Airway Systems Engineering Division (AOS-200) personnel for the field. The contractor shall provide engineering changes to AOS-200 when the changes are released, and prior to field implementation. AOS-200 shall evaluate the changes and approve the change for field implementation via a case file. The CM functions assigned to the ASM-100 CCB are described in the ASM-100 CCB charter.

75.-79. RESERVED.

CHAPTER 8. VERIFICATION

80. FACTORY VERIFICATION. The contractor shall perform tests in accordance with the requirements of the contract, the equipment specification; FAA-G-2828-TACAN Antenna System; FAA-G-2100e, Electronic Equipment, General Requirements; and other documents prior to acceptance of the equipment by the FAA. These tests, design qualification tests, type tests, and production tests shall demonstrate that all hardware, software, and all performance requirements are met before the FAA accepts a Low Power TACAN antenna from the contractor.

81. CHECKOUT. After installation of equipment by the regions, FAA personnel shall conduct checkout tests in accordance with the procedure contained in the contractor developed equipment instruction books. The procedures followed include testing electrical and mechanical hardware interfaces, verifying system performance, maintenance capability, and adequacy of support hardware.

82. CONTRACTOR INTEGRATION TESTING. Not applicable. However, the contractor will support the FAA in the preparation and conduct of the integration test, and evaluation (IT&E) and ST&E at the FAA Technical Center.

83. CONTRACTOR ACCEPTANCE INSPECTION (CAI). Not applicable.

84. FAA INTEGRATION TESTING. The ACW-300 APMT will prepare test plans and procedures for the FAA OT&E Integration and Operational testing to be completed at the FAA Technical Center. This testing will verify the technical performance of the Low Power TACAN Antenna System in a full field environment and that it can interface with the TACAN monitor and control equipment.

85. SHAKEDOWN AND CHANGEOVER. The FAA Technical Center Shakedown Test & Evaluation (ST&E) is the responsibility of AOS-200. ST&E will be conducted on the system installed at the FAA Technical Center and at the first installation site in Galveston, Texas. The sequence of shakedown testing activities will be outlined in the ST&E plan and procedures. AOS-200 will publish the test plan and procedures in sufficient time to ensure regional functions can be properly accomplished. During system shakedown, tests are conducted to verify that the low power TACAN antenna, fully integrated in an operational environment, meets all operational requirements and is fully maintainable. System ST&E activities will include accomplishment of the following:

a. Evaluations to determine the adequacy of system failure detection and recovery procedures.

b. Evaluations to determine the suitability of displayed operational data, and establish if any additional data requirements exist.

c. Verification of the instruction book procedures for installation and tune-up; and procedures for routine and corrective maintenance.

86. JOINT ACCEPTANCE INSPECTION (JAI). A JAI will be completed prior to assumption of maintenance responsibility by the Airway Facilities Sector. The JAI, to be accomplished in accordance with Order 6030.45 will be completed following successful completion of the field shakedown test. The field shakedown test will be completed in accordance with the plans and procedures to be developed by AOS-200. The field shakedown test and the JAI, together, assure that the TACAN antenna complies with requirements in the following areas prior to final acceptance and commissioning.

a. Facility construction and equipment installation.

b. Facility/system/equipment performance including a successful flight inspection.

c. Facility technical performance documentation and maintenance reference data.

d. Facility logistics supports.

e. Facility/system training support.

f. Availability of acceptable system/equipment instruction books.

87.-89. RESERVED.

CHAPTER 9. NATIONAL AIRSPACE INTEGRATED LOGISTICS SUPPORT

90. MAINTENANCE CONCEPT. The maintenance concept for the Low Power TACAN Antenna System shall consist of both site and depot repair.

a. Site Maintenance. Maintenance technicians will replace selected failed Line Replaceable Units (LRU) and may perform limited repair and corrective and preventative maintenance functions as required, onsite.

b. FAA Logistics Center Maintenance. The FAA Logistics Center (depot) maintenance will consist of receipt and repair/replacement of failed LRU's. For repair and testing of LRU's, a "hot" test bed will be required. The program office will provide a TACAN among the first deliveries to accommodate this requirement. Interim Contractor Depot Logistics Support (ICDLS) will be provided by the contractor for a period of one year following initial fielding of the TACAN antenna systems to allow the FAA Logistics Center sufficient time to procure the required spare and repair parts necessary to accomplish depot level support.

c. Maintenance Plan. The Integrated Logistics Support Plan (ILSP) for the Low Power TACAN Antenna Program was approved on February 1, 1991 and provides guidance for NAILS planning and execution. Appendix C of the ISLP contains the Maintenance Plan which describes the requirements for site and depot level repair.

91. TRAINING. The training program for the low power TACAN antenna is contained in the TACAN Antenna Subsystem Training Plan. Assignment of training quotas for the regions will be made by the Technical Training and Certification Branch (ASM-250) for Airway Facilities personnel. Projected training requirements by individual work centers/facilities and principal training milestones are included in the training plan. The initial training of FAA AF personnel will be conducted by the contractor (5 classes of 12 students in the months of January, April, May, June, and July 1993) at the contractor's facility. The contractor classes will train FAA Academy instructor personnel and those engineers and technicians who will perform initial shakedown testing for the first ORD facility and for regional representatives involved in installations. Training courses developed by the contractor will be conducted at the FAA Academy for regional technicians who will perform maintenance on the Low Power TACAN Antenna Systems. Training course graduates will be able to configure the Low Power TACAN Antenna System for normal operation and system testing using the contractor prepared

Technical Instruction Book and FAA handbook requirements. They will possess sufficient knowledge to troubleshoot and repair to LRU level and to perform and document all periodic maintenance. A separate component level training class will be provided approximately 60 to 90 days prior to the FAA Logistics Center assuming full supply support and maintenance responsibilities at the end of the ICDLS period of performance.

92. SUPPORT TOOLS AND TEST EQUIPMENT. This paragraph describes support and test equipment, including all common and special tools, as well as other interface devices necessary to support equipment to the end item or Unit Under Test (UUT). Test equipment is supported at the Airway Facilities sector office having responsibility for the VORTAC facility.

a. Common tools, test/support equipment, interface devices and connectors for maintenance of the Low Power TACAN Antenna System. The contractor provides a list of the common tools, test/support equipment, interface devices and connectors required for maintaining TACAN antenna equipment at all levels of maintenance. This list is subject to review/approval by the program office and ASM-100.

b. Special tools, test equipment, test program sets (TPS), and automatic test equipment (ATE) software needed to perform adjustments, testing and/or maintenance of the low power TACAN antenna will be provided with the equipment, if required.

93. SUPPLY SUPPORT. The FAA Logistics Center is responsible for providing supply support for the TACAN antenna system to include procurement of spare parts peculiar and spare parts common; packaging storage, and transportation requirements; and inventory management. Provisioning of spare parts will be in accordance with FA-G-1375C. In addition, site spares will be furnished. As reflected in table 4-2, the ratio of facility to site spare sets will be approximately 3:1 per sector.

94. VENDOR DATA AND TECHNICAL MANUALS. Instruction books for the Low Power TACAN Antenna System shall be provided by the contractor and reviewed by the FAA prior to acceptance. Two sets of instruction books are provided with each Low Power TACAN Antenna System that is delivered. After the final reproducible Technical Instruction Books are delivered to the FAA, they will be printed and placed in stock. Other technical manuals to be provided by the contractor include: reliability, maintainability documentation, test procedures, and drawings. Prior to delivery of instruction books, ANN-300 will publish information letters to provide regional personnel with pertinent installation data.

95. EQUIPMENT REMOVAL. The present TACAN antenna equipment and speed control amplifiers at locations being replaced within this program will be returned to the FAA Logistics Center in accordance with appendix 1.

96. FACILITIES. Not applicable.

97. EQUIPMENT NOT FURNISHED. Not applicable.

98. PERSONNEL CERTIFICATION. Personnel maintaining the new low power TACAN antenna equipment shall require certification in accordance with Order 3400.3E, Airway Facilities Maintenance Certification Program.

99. EQUIPMENT CERTIFICATION. Equipment certification for the Low Power TACAN Antenna System shall be in accordance with the latest version of Orders 6820.7A, Maintenance of Navigational Aids Facilities and Equipment-VOR, VOR/DME, VORTAC, and 6000.15A, General Maintenance Handbook for Airway Facilities.

CHAPTER 10. ADDITIONAL PROJECT IMPLEMENTATION ASPECTS

100.-199. RESERVED.

APPENDIX 1. RTA-2 EQUIPMENT DISPOSITION

1. SYNOPSIS. The low power TACAN antenna project replaces 203 of 673 TACAN antennas in the FAA inventory. The RTA-2 antennas that are removed will be used to meet critical support requirements for the remaining antenna systems.

2. EQUIPMENT REMOVAL. EXTREME care should be exercised when removing the RTA-2 and the antenna speed control from the facility. The entire system will be refurbished for future support requirements.

3. DISPOSITION COORDINATION. The disposition of the removed equipment requires coordination with Airway Facilities and FAA Logistics Center (AML-600) personnel. For coordination, contact Judy Lay, AML-632, 405-954-5680.

a. Regional Airway Facilities Division. Sector personnel coordinating the installation of the low power TACAN antenna are responsible for contacting the FAA Logistics Center 30 days prior to the scheduled installation, for shipping information and containers for the RTA-2 and the speed control cabinet.

b. Logistics Center Responsibility. The FAA Logistics Center will send shipping containers and documentation prior to the antenna changeout. In the event that the shipping containers and documentation are not available at the time of the changeout, the FAA Logistics Center will coordinate with the facility and expedite the removal of the RTA-2.

NOTE: The RTA-2 and the speed control will NOT be stored or disposed of at the Regional level.

4. EQUIPMENT REUTILIZATION PLAN. The RTA-2 antenna and the speed control will be shipped to the FAA Logistics Center within 30 days of the low power TACAN antenna acceptance. The FAA Logistics Center has the responsibility for reutilization of the RTA-2 antenna system. The office primarily responsible for reuse and coordination of the RTA-2 antenna system is AML-600.